PATENT SPECIFICATION

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No. 36069/35.

COMPLETE SPECIFICATION

Method of Welding Together Tubes and other Elements of Quartz, Hard Glass and other Refractory Materials

We, W. C. HERAEUS GESELLSCHAFT MIT BESCHRÄNKTER HAFTUNG, of Hanau-on-Main, Germany, a German Company, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

When it is desired to join together two pieces of quartz, quartz glass and like tubing it is usually effected by suitably softening the ends to be joined, bringing the two parts together, and then treating the weld so formed by blowing and drawing, whereby a uniform wall thickness is obtained. This method has also been applied to fused silica in the form of quartz glass and quartz material, but, where large dimensions and wall thicknesses are concerned, the method gives rise to difficulties, so that it is generally thought inadvisable to weld objects of quartz, quartz glass or like material, with wall thicknesses of more than 3 millimetres.

The present invention has for its object to provide a method which will enable quartz and quartz-glass parts of large wall thicknesses to be welded together satisfactorily. According to the invention, this object is achieved by making the connecting point in the form of a recessed joint of such depth that absolutely no, or only a small, wall thickness remains at its base. By this means, the welding flame is enabled not only to heat the entire cross-section sufficiently uniformly and to a sufficiently high temperature, but also to soften the innermost portion of the wall. If additional material of the same kind is then introduced into the joint, in the form of grains or rods, it is possible, without great difficulty, to close the joint step by step, if, as is essential with large dimensions the two objects to be joined are secured in their relative positions. Since, in this case, only the joint itself need be heated, no deformation and thickening occur. Subsequent blowing and drawing operations and mechanical treatment of the weld are therefore hardly necessary. On the other hand, with large dimensions and wall thicknesses appreciate care in cooling is called for, and it is desirable, if possible, to stop up the cavities in close proximity to the weld, in order that disturbing air currents may be suppressed.

It is well-known *per se* to weld joints in quartz objects, but the methods hitherto employed differ substantially from the present method.

For instance, quartz rings have been made by welding together the ends of a bent quartz strip, by filling the joint with sand, and heating same both internally and externally. Furthermore, quartz plates have also been welded together by treating the surfaces to be united, bringing them into intimate contact and then heating them externally. In contradistinction to this, in the method according to the present invention the joint remains open, so that an electric arc or blowpipe flame can enter and directly heat the walls, and even with the maximum wall thickness raise them to temperatures even higher than can be obtained by external heating, whereby a better connection of the two parts to be joined results.

The new process is not restricted to materials which acquire a viscous semi-fluid condition in which they may be joined but can be applied to all materials which acquire sufficient strength merely by sintering. In this case, the additional material introduced into the joint is introduced in the form of more or less fine grains, preferably while the flame is applied. In order to obtain the desired degree of sintering with such materials, either provision is made for matching the flame temperature to the grain size, as can be done, for instance, by varying the distance of the burner employed from the work, or by regulating the quantity of material supplied to the joint.

The value of the method lies in the fact that the assemblage of thick-walled vessels of glass, quartz glass, other quartz materials, corundum and other sinterable materials is now possible. For instance, tubes which could hitherto neither be manufactured nor conveyed in comparatively great lengths can now be made as long as desired, and tubes of quartz mate-

[*Price* 1/-]

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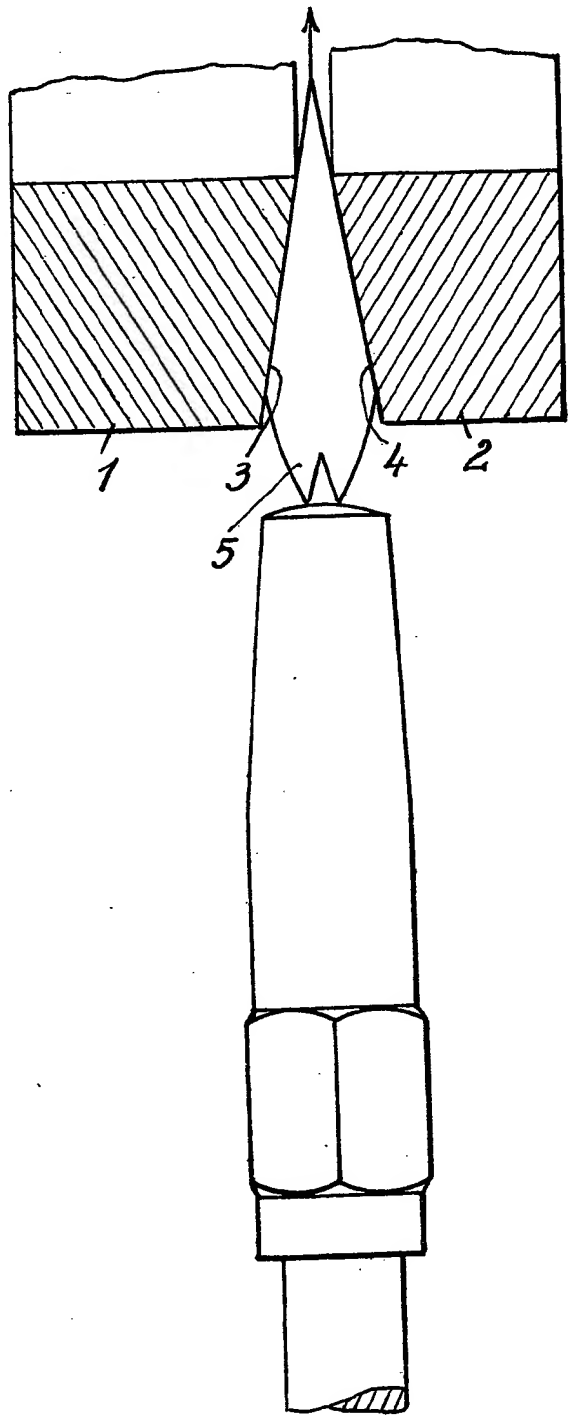
1 SHEET



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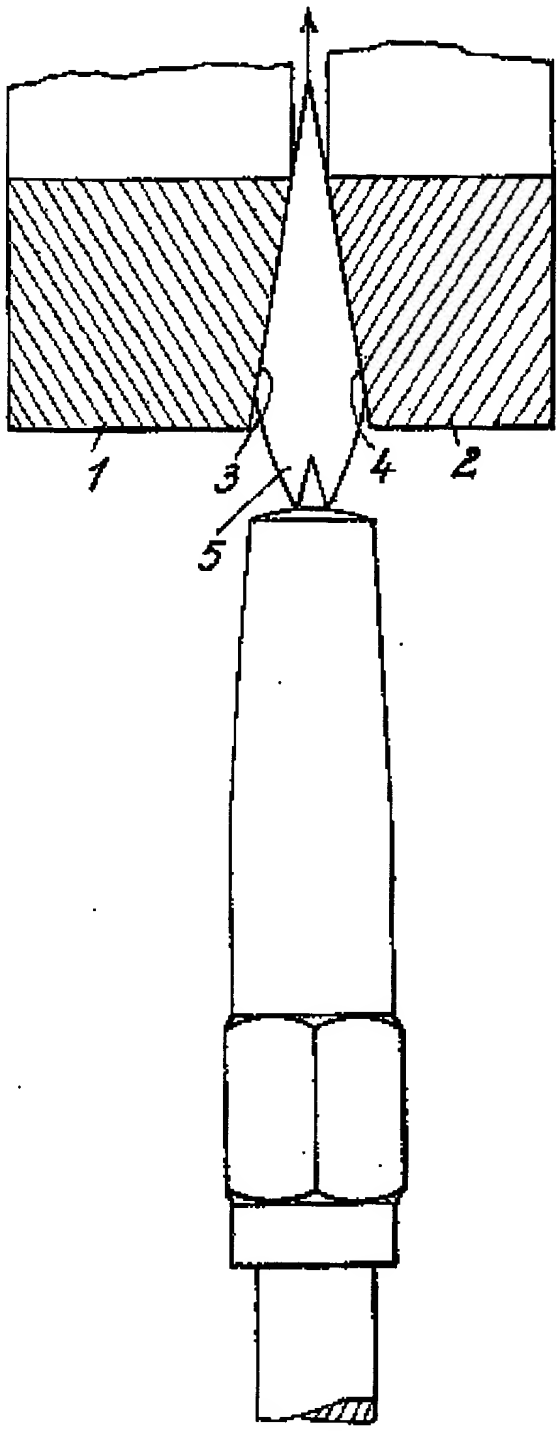

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